REMARKS/ARGUMENTS

A new title has been suggested in view of the Examiner's objection. It is submitted that this new title is indicative of the invention to which the claims are directed.

The Examiner has rejected claims 1 and 9 under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, the Examiner has objected to the expression "similar amounts of energy" in these claims.

While it is not conceded that this expression is indefinite, the claims have been revised in order to meet the Examiner's concerns. More particularly, the last paragraph of claim 1 has been revised to specify that "the ratio of the amount of energy reflected at the first frequency to the amount of energy reflected at the second frequency by the one type of material is significantly greater than the ratio of the amount of energy reflected at the first frequency to the amount of energy reflected at the second frequency by the other type of material". This represents a clarification of the claim and avoids the expression to which the Examiner objected. The amendment is supported by the specification at various locations. Specifically, at lines 16 to 19 of page 16 of the specification it is stated that "the ratio of the average reflection magnitude at the K-band in relation to that at the C-band from animate targets is therefore larger than the corresponding ratio for inanimate targets". Additionally, in the sentence bridging pages 16 and 17 of the specification it is stated that for animal material, i.e. in the case of an animal or toddler, the return signals received at the sensing apparatus "will be significantly different in magnitude". Further, it is stated in the sentence bridging pages 10 and 11 of the specification that "animate tissue may reflect less energy at one frequency than at the other, whereas inanimate tissue may reflect substantially equal amounts of energy at both frequencies". The last paragraph of claim 9 has been amended in an analogous manner.

It is submitted that, as amended, claims 1 and 9 overcome the objection by the Examiner under 35 U.S.C. 112, second paragraph.

Claims 1 and 9 have also been revised to clarify the operation of the "signal processing unit". In the specific embodiment described it is stated at lines 25 to 27 of page 10 of the specification that "the magnitude returns at both radio frequencies f1 and f2 are compared to one another to establish a magnitude ratio". At lines 2 to 4 it is stated that in this way "a bench mark for determining whether or not a target is animate can be easily extrapolated from experimental data" and in the next sentence it is stated that "if the magnitude return ratio meets the bench mark for an animate object" then a living creature is identified. Although in the specific embodiment described a ratio of the energies received at both frequencies is established other forms of comparison, for example the difference in the energy received at both frequencies, could be used. It was the intention to recite in claim 1 the fact that the signal processing unit involves an "evaluation comprising a comparison of the reflections received by the first receive signal chain to the reflections received by the second received signal chain, which comparison is measured against a benchmark that indicates whether or not an object is of one type of material or another type of material" and this has now been recited positively in claim 1.

Similarly, a corresponding method step in claim 9, i.e. method step iv), recites "comparing the reflections received at the first frequency to the reflections received at the second

frequency and measuring the comparison against a benchmark to determine whether or not an object is of the certain type of material or not".

The Examiner has rejected claims 1-2, 7, 9-10, and 15 under 35 U.S.C. 102(e) as being anticipated by Sato *et al.* (US 2003/0197126). More particularly, in referring to claims 1 and 9, the Examiner states that the evaluation comprising "a comparison of the respective reflections received by the first and second received signal chains to a bench mark that indicates whether or not an object is of one type of material...or another type of material...". With the revised wording of claim 1, it is clear that the comparison that is being referred to is between the reflections received by the first received signal chain and the reflections received by the second received signal chain. No such comparison is carried out by Sato. Sato is looking only at the actual reflections received at each frequency and not a comparison or ratio of reflections at the two frequencies. Nowhere in Sato is there any mention of comparing the reflections at two frequencies.

The Examiner also states on page 3 that in Sato *et al.* it is inherent that "similar amounts of energy are reflected by objects of another type from signals transmitted at "the first and second frequencies". This is completely untrue. A review of Figure 2 of Sato will show that the reflection characteristics of the various materials vary continuously over the spectrum and there are no two frequencies where essentially the same amount of energy is reflected. Indeed, it is entirely inherent in Sato that this is the case, namely that the amount of energy reflected varies across the different frequencies rather than is the same. In contrast, a key feature of the invention, as claimed in the last paragraph of claim 1, is that the first and second frequencies are specifically selected such that when you measure the ratio of the energy reflected at the two frequencies this gives a means of discriminating between materials because for one material the ratio is considerably higher than it would be for the other material. That is because, for rocks, for example, the ratio would be close to one because substantially the same amounts of energy are reflected at both frequencies whereas for animal tissue a greater amount of energy is reflected at one frequency than the other frequency. It is crucial to the invention that the first and second frequencies are selected to provide this precise characteristic. In the specific embodiment described the two frequencies lie respectively in the C and K bands but of course other selected frequencies could be used. In Sato *et al.* no such selection of frequencies is made and indeed the frequencies at which measurements are made in Sato *et al.* are all close together in the infrared spectrum.

Thus, Sato *et al.* does not disclose all of the features of claim 1 and does not, therefore, anticipate claims 1 and 9.

As all of the other claims are dependent on claims 1 and 9, clearly the dependent claims distinguish over Sato *et al.* for at least the same reasons that claims 1 and 9 do. In addition, the Examiner's suggestion (in relation to claims 2 and 10) at the bottom of page 3 of the Office Action, that "Sato teaches the signal processor calculates a magnitude ratio of the respected reflections received by the first and second received signal change to know the difference between the signals, which is then compared to the bench mark" is entirely incorrect as the above explanation makes clear.

With reference to claims 7 and 15, these claims have been clarified to specify that the comparison distinguishes animal objects including humans from non-animal objects. No such comparison is disclosed in Sato.

The Examiner has rejected claims 1 and 9 under 35 U.S.C. 102(e) as being anticipated by Caulfield (US 2002/0159334).

Firstly, the Examiner is incorrect in stating that Caulfield discloses "a first and second transmit signal chain". There is no second transmit signal chain in Caulfield, only one EM source 24 which is equivalent to a first transmit signal chain. Caulfield does disclose submitting pulses at different frequencies but it is assumed that this is achieved by varying the output of the EM source 24. This is not the equivalent of a second transmit signal chain because in Caulfield the pulses at the two frequencies must necessarily be serial, i.e. not simultaneous. The system as claimed in claim 1, in reciting both a first transmit signal chain and a second transmit signal chain, enables signals at both frequencies to be transmitted simultaneously. Not only would this give a faster real time response which is crucial in connection with sensing objects in a hazard situation such as under a vehicle as described but simultaneous sensing means that the two frequencies are seeing the exact same object in time and space wherein in serial transmission, the object could move between the first and second transmissions thereby compromising the sensing result.

Additionally, it is not true that Caulfield selects first and second frequencies "such that the ratio of the amount of energy reflected at the first frequency to the amount of energy reflected at the second frequency" is significantly greater for one material than another. Caulfield, as Sato, is entirely silent as to this feature. Thus, claim 1 is not disclosed by Caulfield. While claim 9 does not necessarily imply simultaneous transmission of signals on the first and second frequencies, this claim is also not anticipated by Caulfield for the same reasons that Sato does not anticipate.

The Examiner has rejected claims 8 and 16 under 35 U.S.C. 103(a) as being unpatentable over Caulfield. This rejection is predicated on the Examiner's incorrect belief that Caulfield anticipates claims 1 and 9. Given that Caulfield does not disclose what is recited in claims 1 and 9, clearly claims 8 and 16 also patentably distinguish over Caulfield. In addition, Caulfield is particularly directed to detecting the substance of an object "contained within an enclosure" and for that reason alone, it would be entirely counter intuitive to suggest that Caulfield be located under a vehicle for detecting non-occluded objects as shown in Fig. 4 of the instant application. Also, with regard to claim 16, the Examiner has made a bald assertion that filtering static clutter is well known without adducing any evidence to form that conclusion.

The Examiner has rejected claims 3, 5, 11, and 13 under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Caulfield. Once again, this rejection is predicated on a false belief by the Examiner that independent claims 1 and 9 are disclosed by Sato and Caulfield. The simple fact is that neither reference discloses or suggests that two frequencies may be selected such that the response ratio for reflections at the two frequencies is going to be markedly different for one material than for another material such that that can be used as the basis for distinguishing between materials. Certainly there is no suggestion that the two frequencies may be respectively in the C and K bands. Accordingly, none of these claims are obvious.

The Examiner has rejected claims 4 and 14 as being unpatentable in view of Sato *et al.* in view of Caulfield and further in view of Salmon. As claims 4 and 14 are dependent ultimately on claims 1 and 9, these claims are patentable for the same reasons that claims 1 and 9 are. In addition, the Examiner's reading of Salmon is incorrect. More particularly, Salmon does not disclose "generating in-phase and quadrature channels" as components of the reflection for processing. The portion of Salmon to which the Examiner has referred has to do with measuring the real and complex components of the relative permittivity of the object. This has absolutely nothing to do with using I and Q channels of radio frequencies. Thus, claims 4 and 14 are not disclosed or suggested by Salmon.

The Examiner has rejected claim 16 under 35 U.S.C. 103(a) as being unpatentable over Sato *et al.* As this claim is dependent on claim 9, clearly is patentably for at least the same reasons that claim 9 is. In addition, the Examiner's assertion that subtracting static clutter is well known is simply an allegation without any evidence to back it up.

For the above reasons, it is respectfully submitted that none of the claims discussed thus far are either disclosed or suggested by any of the references taken singly or in combination.

In addition, new claims 17 to 27 are all distinguishable over the prior art for at least the same reasons that claims 1 and 9 are.

Claims 17 and 20 specify the use of electromagnetic pulses at the two frequencies and this is of course fully supported by the specific embodiment described. See, for example, line 27 of page 7 of the description.

Claims 18 and 21 are based on claims 4 and 12 but are dependent respectively on new claims 17 and 20.

Claim 19 specifies that the signals are transmitted simultaneously. This is inherent in the description of the specific embodiments, particularly, starting from line 27 on page 7 of the specification.

Claim 22 corresponds to Claim 16, but is dependent on Claim 1.

Claims 23 to 26 are based on claims 4 and 12 but are dependent respectively on claims 22, 1, 16 and 9.

Finally, claim 27 is dependent on claim 9 and specifies that the transmitted and received signals are unobstructed, i.e. there is a clear line of sight between the sensing system and the objects being sensed. This is inherent in the description of the specific embodiments, particularly, as shown in Fig. 4.

It is submitted that the application is in allowable form. However, the Examiner is respectfully requested to telephone the undersigned if there are any remaining issues to be resolved.

Respectfully submitted,

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